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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/643,946	08/23/2000	Kevin J. Torek	M4065.0166/P166-A	2940

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EXAMINER

VINH, LAN

ART UNIT	PAPER NUMBER
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1765

7

DATE MAILED: 01/16/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

TD-7

Office Action Summary

Application No.

09/643,946

Applicant(s)

TOREK ET AL.

Examiner

LAN VINH

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 November 2001.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 142-160 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 142-160 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 142-157 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schellenberger et al. (US 5,714,203) in view of Ward et al (US 5,988,186)

Schellenberger discloses a method for drying semiconductor substrate including the step of dipping the substrate in a cleaning solution. This solution comprises of:

hydrofluoric acid (HF) (col 3, lines 55-56)

acids such as hydrochloric acid (HCl), phosphoric acid (H₃PO₄) (col 3, lines 58-59)

alcohol (col 3, lines 56-57)

citric acid (col 3, lines 57-58) reads on citric acid acting as a surface passivation agent especially since citric acid is of the same chemical element as the claimed surface passivation agent as defined in page 10 of the specification.

Since, Schellenberger' s cleaning solution contains up to 80 % of alcohol (a known non-aqueous solvent) (col 3, lines 63-64), it reads on a substantially non-aqueous solution because the claimed substantially non-aqueous solution as defined as a solution that has approximately 80-95% of alcohol in page 10 of the specification.

Art Unit: 1765

Unlike the instant claimed inventions as per claims 142,150, Schellenberger does not specifically disclose using propylene glycol (a known non-aqueous solvent/ alcohol) in the cleaning solution although Schellenberger does disclose using alcohol in the cleaning solution.

However, Ward discloses an acidic semiconductor cleaning solution containing alcohol such as propylene glycol (col 4, lines 40-42)

Therefore, one skilled in the art would have found it obvious to modify Schellenberger 's cleaning solution by using propylene glycol in the solution in view of Ward teaching because Schellenberger suggests that alcohol can be used in the cleaning solution and Ward teaches that solvent/alcohol which can be used in the semiconductor cleaning solution include and not limit to polyhydric alcohol such as propylene glycol (col 4, lines 40-42)

Regarding claims 143, 151, Schellenberger's cleaning solution differs from the claimed cleaning solution by having additives such as surfactant, solid additive whereas the claimed cleaning solution consisting essentially of :HF, phosphoric acid/hydrochloric acid, alcohol/propylene glycol and citric acid. However, since Schellenberger already discloses using 0-50 wt% of acids, 0-80 wt% of alcohol, 0-5 wt% of surfactant and 0-50 wt % of solid additive (col 3, lines 63-65) in the cleaning solution, one skilled in the art would have found it obvious to adjust the concentration of the components in Schellenberger's cleaning solution through routine experimentation to achieve a cleaning solution using 0-50 wt% of acids, 0-80 wt% of alcohol, 0 wt% of

Art Unit: 1765

surfactant and 0 wt % of solid additive/a cleaning solution consisting essentially of HF, phosphoric acid, alcohol/propylene glycol and citric acid.

Regarding claims 144-149, 152-157, Schellenberger fails to disclose the specific proportion/concentration of the components in the cleaning solution although Schellenberger does disclose the adjustable concentration ranges of the components as described above. Therefore, the selection of the specific proportion/concentration of the components in the cleaning solution would have been obvious because the selection of particular values for these variable would simply involve routine experimentation to discover the optimum or workable ranges.

3. Claims 158-160 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schellenberger et al. (US 5,714,203) in view of Ward et al (US 5,988,186)

Schellenberger discloses a method for drying semiconductor substrate including the step of dipping the substrate in a cleaning solution. This solution comprises of:

hydrofluoric acid (HF)/a fluorine source (col 3, lines 55-56)

acids such as hydrochloric acid (HCl), phosphoric acid (H₃PO₄)/complementary acid of hydrochloric acid or phosphoric acid (col 3, lines 58-59)

alcohol/ a non-aqueous solvent (col 3, lines 56-57)

citric acid/a surface passivation agent (col 3, lines 57-58)

Since, Schellenberger' s cleaning solution contains up to 80 % of alcohol (a known non-aqueous solvent) (col 3, lines 63-64), it reads on a substantially non-aqueous

Art Unit: 1765

solution because the claimed substantially non-aqueous solution as defined (in page 10 of the specification) as a solution that has approximately 80-95% of alcohol.

Schellenberger's cleaning solution differs from the claimed cleaning solution as per claim 158 by having additives such as surfactant, solid additive whereas the claimed cleaning solution consisting essentially of :HF, phosphoric acid/hydrochloric acid, alcohol/propylene glycol and citric acid. However, since Schellenberger already discloses using 0-50 wt% of acids, 0-80 wt% of alcohol, 0-5 wt% of surfactant and 0-50 wt % of solid additive (col 3, lines 63-65) in the cleaning solution, one skilled in the art would have found it obvious to adjust the concentration of the components in Schellenberger's cleaning solution through routine experimentation to achieve a cleaning solution using 0-50 wt% of acids, 0-80 wt% of alcohol, 0 wt% of surfactant and 0 wt % of solid additive/a cleaning solution consisting essentially of :HF, phosphoric acid, alcohol/propylene glycol and citric acid.

Unlike the instant claimed inventions as per claims 159, 160, Schellenberger does not specifically disclose using propylene glycol (a known non-aqueous solvent/ alcohol) in the cleaning solution although Schellenberger does discloses using alcohol in the cleaning solution.

However, Ward discloses an acidic semiconductor cleaning solution containing alcohol such as propylene glycol (col 4, lines 40-42)

Therefore, one skilled in the art would have found it obvious to modify Schellenberger 's cleaning solution by using propylene glycol in the solution in view of Ward teaching because Schellenberger suggests that alcohol can be used in the

Art Unit: 1765

cleaning solution and Ward teaches that solvent/alcohol which can be used in the semiconductor cleaning solution include and not limit to polyhydric alcohol such as propylene glycol (col 4, lines 40-42)

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Woo et al (US 5,698,041) discloses that propylene glycol is a non-aqueous solvent (col 9, lines 18-20)

Jagannathan et al. (US 5,304,284) discloses that alcohols are non-aqueous solvents (col 5, lines 46-48)

Response to Arguments

5. Applicant's arguments with respect to claims 158 have been considered but are moot in view of the new ground(s) of rejection.

In traversing the examiner rejection of claims 142, 150, the applicants argue that neither of the cited references teaches a substantially non-aqueous solution. The examiner disagrees because while it is true that Schellenbergers's solution contains small amount of water it is also true that the claimed 's conditioning solution also contains small amount of water (line 5, page 11 of the specification). In addition, the claimed substantially non-aqueous solution as defined (in page 10 of the specification) as a solution that has approximately 80-95% of alcohol. Since both Schellenbergers' s cleaning solution and the claimed conditioning solution contains small amount of water,

acids and up to 80 % of alcohol, Schellenbergers' s certainly reads on a substantially non-aqueous solution as recited in claims 142 and 150.

In response to applicant's argument that Schellenberger makes no mention of removing dry etch residues, the examiner recognizes that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure/composition is capable of performing the intended use, then it meets the claim. In this case, since Schellenberger's cleaning solution contains the same elements of HF, phosphoric/hydrochloric acid, alcohol, citric acid as the claimed conditioning solution and Schellenberger also discloses using the cleaning solution to clean semiconductor wafer, one skilled in the art would have found it obvious to employ Schellenberger 's cleaning solution in removing dry etch residues remaining on a semiconductor substrate . See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

6. Applicant's amendment necessitated the new ground(s) of rejection for claims 158-160 presented in this Office action. The rejection of claims 142-157 is maintained as in previous office action (paper no. 5). Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

Art Unit: 1765

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAN VINH whose telephone number is 703 305-6302. The examiner can normally be reached on Monday-Friday 8:30 -6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, BENJAMIN L UTECH can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.



LV

January 14, 2002